AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Currently Amended) A method for obtaining closed form expressions for subsurface temperature depth distribution along with its error bounds, the method comprising:

~~using a stochastic heat conduction equation incorporating random thermal conductivity to obtain a mean and variance in temperature fields for~~providing inputs selected from at least two different types of boundary conditions involving at least three different heat sources; and

using said inputs in a stochastic heat conduction equation incorporating random thermal conductivity to obtain a mean and variance in temperature fields for said input, said equation being:

$$\frac{d}{dz}\{(\overline{K} + K'(z))\frac{dT}{dz}\} = -A(z) \qquad (1)$$

where

T is the temperature (°C),

A(z) is the radiogenic heat source (μW/m^3),

K(z) = $\overline{K}$ + K'(z) is the thermal conductivity (W/m°C)

which is expressed as a sum of a deterministic component $\underline{\overline{K}}$ and a random component

K'(z) is the random component with mean zero and a Gaussian colored noise correlation structure represented by

$$E(K'(z)) = 0 \qquad (2)$$

$$E(K'(z_1)K'(z_2)) = \sigma\frac{2}{K} = \sigma\frac{2}{K}e^{-p|z_1-z_2|} \qquad (3)$$

where

$\sigma\frac{2}{K}$ is the variance in thermal conductivity (W/m°C)

ρ is the correlation decay parameter m^{-1} (or $1/\rho$ is the correlation length scale) and z_1 and z_2 are the depths (m).

2. (Previously Presented) A method as in claim 1 wherein one of said boundary conditions represents the condition of heat sources and is selected from the group consisting of Zero (A(z)=0), Constant (A(z) = A) and exponentially decreasing with depth (A(z) = $A_0 e^{-z/D}$)

3. (Previously Presented) A method as in claim 1 wherein said boundary conditions comprise constant surface temperature and constant surface heat flow.

4. (Previously Presented) A method as in claim 1 wherein said boundary conditions comprise constant surface temperature and constant basal heat flow.

5. (Previously Presented) A method as in claim 1 wherein a parameter used is that of radiogenic heat generation.

6. (Previously Presented) A method as in claim 1 carried out electronically using a computing means and wherein appropriate numerical values are given for controlling thermal parameters directly in boxes that appear on a screen of the computing

means, thereby instantaneously computing and plotting the mean and error bounds on the temperature depth distribution.

7. (Previously Presented) A method as in claim 1 wherein the subsurface is one of a group consisting of: an oil field, a natural gas field, tectonically active area and a mineral resource area.